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10/529,040	03/24/2005	Hiromasa Sakai	050340-0186	6230

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EXAMINER	
LEWIS, BEN	

ART UNIT	PAPER NUMBER
1745	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/529,040	SAKAI, HIROMASA	
	Examiner	Art Unit	
	Ben Lewis	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-15 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 08 May 2007 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Detailed Action

1. The Applicant' amendment filed on May 8th, 2007 was received. Claims 11-15 were added.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action (issued on February 8th, 2007).

Claim Rejections - 35 USC § 103

3. Claims 1-3, 6, 8-10 and 15 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Kanai et al. (U.S. Pub. No. 2001/0021468 A1).

With respect to claims 1, 9 and 10, Kanai et al. disclose a fuel cell system (title) wherein the fuel cell system of this invention comprises a fuel cell (1,101) which generates power by using a supply of fuel gas and oxidizing gas; a water-permeable-type humidifier (a hollow fiber membrane water collecting apparatus 2, a water-permeable-type humidifier 123) which collects water from exhaust gas exhausted from the fuel cell, and humidifies the gas supply to the fuel cell; and an auxiliary humidifier which is provided with a vapor/liquid separator (3 "radiator", a condenser 126) which separates the water from the exhaust gas, a collected water storage tank (4, a reservoir section of a condenser 126) which stores the separated collected water (9), and an

injector (17,126b) which injects the collected water, stored in the collected water storage tank, to the gas supply or the exhaust gas (Paragraph 0013).

With respect to a flow generator, Kanai et al. teach that in step S65, the collected water supply pump 7 is operated and the collected water 9 is transferred to the humidifying water auxiliary tank 18 (Paragraph 0128).

With respect to a controller, Kanai et al. teach that the number of rotations of the collected water supply pump 7 may be controlled by using a pressure gauge to detect the water pressure, or by using a preset data table to determine the relationship between the gas supply pressure and the number of rotations of the collected water supply pump 7 (Paragraph 0109).

With respect to the defrosting device, Kanai et al. do not specifically teach a defrosting device for melting ice in the water talk by applying heat of the coolant to the water tank. However, Kanai et al. teach that freezing can be prevented by providing an electrical heater (anti-freeze apparatus; not shown in FIG. 15) inside the collected water storage tank 4 (Paragraph 0156). Applying heat of a coolant to the water tank to melt ice and providing an electrical heater inside the water tank to prevent freezing (ice) are functionally equivalent ice melting means. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute coolant heat transfer to the water tank to melt ice with the electrical heaters in the fuel cell system disclosed by Kanai et al.

With respect to claim 2, Kanai et al. teach that freezing can be prevented by providing an electrical heater (anti-freeze apparatus; not shown in FIG. 15) inside the collected water storage tank 4 (Paragraph 0156).

With respect to claims 3, Kanai et al. teach that anti-freeze heaters (not shown), and sensors T2 and T3 for detecting the temperatures of the reservoir sections of the condenser 126 and the auxiliary water tank 126d respectively, are attached to the condenser 126 and the auxiliary water tank 126d. Based on the results detected by the sensors T2 and T3, the heaters are activated in order to prevent freezing when the temperatures of the reservoir sections "coolant" of the condenser 126 and the auxiliary water tank 126d fall below temperatures near freezing (Paragraph 0239).

With respect to claims 6 and 8, Kanai et al. teach that when the temperature of the collected water "fuel cell temperature" is below the predetermined temperature, the flow proceeds to step S87, in which it is determined whether an outside air temperature, obtained by using an outside air temperature sensor (not shown), is below a predetermined temperature (e.g. 0 ^{0}C) (Paragraph 0145). Kanai et al. also teach that start the operation for preventing the collected water from freezing, in step S83, the three way valve 21 is switched to the humidifying water auxiliary tank 18 side (Paragraph 0141).

With respect to claim 15, Kanai et al. teach that the fuel cell system is used as a vehicle power plant (Paragraph 0216).

Claim Rejections - 35 USC § 103

4. Claims 4-5,7,11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanai et al. (U.S. Pub. No. 2001/002468 A1) in view of Ballantine et al. (U.S. Pub. No. 2003/0064262 A1).

With respect to claims 4-5, 7 and 14, Kanai et al. disclose a fuel cell system in paragraph 3 above. Kanai et al does not specifically teach bypassing the radiator. However, Ballantine et al disclose a fuel system wherein the coolant circuit is adapted to transfer heat from the fuel cell to the heat sink, and a radiator is provided to remove heat from the coolant circuit. The radiator can include a fan connected to the controller, where the controller is configured to reduce an output of the fan when there is a heat demand signal. The controller is further configured to increase an output of the fan when there is no heat demand signal. Ballantine et al also teach that the coolant circuit further includes a bypass valve and a radiator bypass circuit. The valve "switch" is connected to the controller, and the controller is adapted to actuate the valve to divert a coolant flow from the radiator to the radiator bypass circuit when there is a heat demand signal. The controller is further adapted to actuate the valve to divert the coolant flow from the radiator bypass circuit to the radiator when there is no heat demand signal

(Paragraph 0113 - 0114). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the controlled radiator bypass stream of Ballantine et al. into the fuel cell system of Kanai et al. because a controlled radiator bypass stream would allow the heat generated by the fuel cell to be controlled more efficiently.

With respect to claim 11, Kanai et al. teach that anti-freeze heaters (not shown), and sensors T2 and T3 for detecting the temperatures of the reservoir sections of the condenser 126 and the auxiliary water tank 126d respectively, are attached to the condenser 126 and the auxiliary water tank 126d. Based on the results detected by the sensors T2 and T3, the heaters are activated in order to prevent freezing when the temperatures of the reservoir sections "coolant" of the condenser 126 and the auxiliary water tank 126d fall below temperatures near freezing (Paragraph 0239). Kanai et al. also teach that the anti-freezing apparatus may be set to operate when the temperature of the collected water falls below a predetermined temperature (e.g. below 3 °C.). According to this constitution, the anti-freezing apparatus does not operate when the water is not in danger of freezing (Paragraph 0025).

Claims 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kanai et al. (U.S. Pub. No. 2001/002468 A1) in view of Ballantine et al. (U.S. Pub. No. 2003/0064262 A1) as applied to claim 11 above and further in view of Toohata et al. (JP 8-273,689.

With respect to claims 12 and 13, Kanai et al. as modified by Ballantine et al. disclose a fuel cell system in paragraph 4 above. Kanai et al. as modified by Ballantine et al. do not specifically disclose a heat exchanger integrated with a catalytic combustor and an electrically heated catalyst for increasing the temperature of gasses supplied to the catalytic combustor and the heat generated by the catalytic combustor being applied to the coolant by the heat exchanger. However, Toohata *et al.* disclose a fuel cell system with a water circulation system including a tank (62), as well as a reformer (20) which is heated by a burner (catalytic combustor) (24), and which produces H_2 for the fuel cell anode. The reformer thus has an output connected to a fuel cell input. Because the fuel cell of Kanai et al. as modified by Ballantine et al. also uses H_2, it would be obvious to use a reformer and burner to supply the needed H_2 as shown by Toohata *et al.*

Toohata *et al. also* disclose a fuel cell which includes a control system which prevents, or counteracts freezing, by activating a process gas burner (24), which heats an exhaust passage (72), and then by heat exchange warms up the pipes (50, 52, 60) used to carry water (sections 0032 and 0033). Heat exchanger (78) receives heat from exhaust gas passage (72). Heat exchanger (78) then heats water in water storage tank (62) (section 0024), in response to the detection of freezing conditions (section 0028 through 0030). This operation is stopped when the freezing is detected to be over (section 0030). Because Toohata *et al.* teach that fuel cells are subject to freezing when not in use (section 0014), it would be obvious to use the water tank heating and control

system of Toohata *et al.* in the fuel cell system of Kanai et al. as modified by Ballantine et al.

Response to Arguments

5. Applicant's arguments filed on May 8th, 2007 have been fully considered but they are not persuasive.

Applicant's principal arguments are

(a) Kanai et al., however, do not anticipate the claimed fuel cell systems and method for controlling a fuel cell system because Kanai et al. do not disclose a defrosting device for melting ice in the water tank by applying heat of the coolant to the water tank, as required by claim 1; a defrosting means for melting ice in the water tank by applying heat of the coolant to the water tank, as required by claim 9; and providing a defrosting device for melting ice in the water tank by applying heat of the coolant to the water tank, as required by claim 10.

(b) The combination of Kanai et al. and Ballantine et al., however, do not suggest the claimed fuel cell system. Ballantine et al. do not cure the deficiencies of Kanai et al. Ballantine et al. disclose a radiator for removing heat from the coolant of the fuel cell.

Ballantine et al. do not disclose a defrosting device for melting ice in the water tank by applying heat of the coolant to the water tank, as required by claim 1.

In response to Applicant's arguments, please consider the following comments.

(a) and (b) With respect to the defrosting device, Kanai et al. do not specifically teach a defrosting device for melting ice in the water talk by applying heat of the coolant to the water tank. However, Kanai et al. teach that freezing can be prevented by providing an electrical heater (anti-freeze apparatus; not shown in FIG. 15) inside the collected water storage tank 4 (Paragraph 0156). Applying heat of a coolant to the water tank to melt ice and providing an electrical heater inside the water tank to prevent freezing (ice) are functionally equivalent ice melting means. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute coolant heat transfer to the water tank to melt ice with the electrical heaters in the fuel cell system disclosed by Kanai et al.

Conclusion

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben Lewis whose telephone number is 571-272-6481. The examiner can normally be reached on 8:30am - 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Ben Lewis

Patent Examiner
Art Unit 1745

PATRICK JOSEPH RYAN
SUPERVISORY PATENT EXAMINER